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Nonlocal effects in light emission by N atoms: collective eigenstates and their decay rates XIWEN ZHANG, ANATOLY SVIDZINSKY, LUQI YUAN, Texas A&M University — Collective emission of light by atomic ensembles yields fascinating phenomena of superradiance and radiation trapping even at the single photon level. Here we discuss how time retardation caused by the finite value of the speed of light modifies collective evolution of atoms. In particular, we consider spherical geometry and show that nonlocal effects can substantially modify eigenstates of the system and their decay rates for small atomic samples due to large collective Lamb shift in this limit. We also show how cross-over between local (monotonic decay) and non-local (collective oscillations) dynamics occurs for an extended atomic cloud prepared by absorption of a spherical photon.

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